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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,920	06/20/2003	Chanro Park	2003 P 50817 US	6232
25962	7590	03/29/2004	EXAMINER	
SLATER & MATSIL, L.L.P. 17950 PRESTON RD, SUITE 1000 DALLAS, TX 75252-5793			ROCCHEGIANI, RENZO	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 03/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/600,920	PARK ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Renzo N. Rocchegiani	2825	<i>aw</i>

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 9-10, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,703,676 B2 (Hirai et al.) in view of U.S. Patent Application Publication No. 2003/0216018 A1 (Yamada et al.).

Hirai et al. disclose a process to form a magnetic memory device comprising the steps of patterning the bottom electrode (item 25) prior to depositing the soft layer material (item 18). Hirai et al. further disclose that the device formation method may include additional initial steps of providing a workpiece (items 1-6), depositing a first insulating layer (item 7) and forming a plurality of first conductive lines (item 9) within the insulating layer, wherein the bottom electrode is formed over one of the conductive lines (Fig. 10B). In addition, Hirai et al. disclose forming a second dielectric layer (item 11) over the first dielectric layer and conductive lines and patterning the second insulating layer and filling the patterns with conductive material (items 10 and 14) that makes an electrical connection with the bottom portion of the magnetic memory cell portion (Fig. 11B) and a third insulating layer (item 22) with a plurality of conductive lines (Fig. 18A, item 21) therein wherein one line makes an electrical contact with the top portion of the magnetic memory cell (Fig. 17B).

Hirai et al. do not disclose patterning the bottom electrode by using an patterned etch mask, made of an oxide material and about 1000 to 5000 Angstroms thick, that is etched while the bottom electrode is patterned.

Yamada et al. teach the patterning of an electrode (item 4) using an etch mask (item 5) such as a silicon oxide [0031] with an adjusted thickness [0036], that is patterned over the electrode (Fig. 5B) and then etched while patterning the electrode (Fig. 6B and [0036]).

It would have been obvious to one with ordinary skill in the art to combine the teachings of Yamada et al. to those of Hirai et al., since Yamada et al. teach that by patterning the electrode using the pattern etch mask they prevent the problem of overetching the electrode.

Furthermore, it would have been obvious to one with ordinary skill in the specific art to make the patterned mask 1000 to 5000 Angstroms thick, since been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

3. Claims 4-8 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,703,676 B2 (Hirai et al.) in view of U.S. Patent Application Publication No. 2003/0216018 A1 (Yamada et al.) and in further view of U.S. Patent No. 6,518,588 B1 (Parkin et al.).

As stated in paragraph 2, all the limitations of the claims have been met except

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for teaching that the bottom electrode comprises a Ta layer, a TaN layer and an PtMn layer and their respective thicknesses.

Parkin et al. teach the formation of a magnetic memory cell wherein a bottom electrode contact material may comprise a Ta layer, a TaN layer and a PtMn layer. (items 52, 54 and 41 and col. 3, lines 42-60). Parkin et al. also teaches that the Ta layer may be 50 angstroms and the TaN layer may be 100 angstrom thick. (col. 4, lines 59-63)

It would have been obvious to one with ordinary skill in the specific art to form the bottom electrode material to comprise Ta, TaN and PtMn, since Hirai et al. teaches forming the electrode of Ti or TiN and Parkin et al. teach that tantalum material may be used in place of titanium material, and since the combination taught in Parkin et al. would result in thermal stability and low resistivity. (col. 2, lines 25-30 and col. 5, lines 35-50).

Furthermore, it would have been obvious to one with ordinary skill in the specific art to make these layers of the desired thickness, since been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

4. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,703,676 B2 (Hirai et al.) in view of U.S. Patent Application Publication No. 2003/0216018 A1 (Yamada et al.) and in further view of U.S. Patent Application Publication No. 2004/0026369 A1 (Ying et al.).

As stated in paragraph 2, all the limitations of these claims have been met except

for teaching that the soft material layer is patterned using a hard mask deposited over the soft material after the hard mask has been patterned.

Ying et al. teach a process to form magnetic memory cells wherein the soft material layer is etched by depositing a hard mask layer, patterning the hard mask and using it as an etch mask. (Fig. 1).

It would have been obvious to one with ordinary skill in the specific art to use a hard mask layer to etch the magnetic material, i.e. soft material, since Ying et al. teach that using a hard mask layer improves etch selectivity and reduces residue. [0005 – 0007].

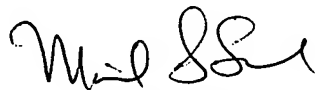
### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo Rocchegiani whose telephone number is (571) 272-1904. The examiner can normally be reached on Monday through Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached at (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

RNR

March 10, 2004

  
MATTHEW SMITH  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800